UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

HEAVY USE AREA PROTECTION

(Ac.)

CODE 561

DEFINITION

The stabilization of areas frequently and intensively used by people, animals, or vehicles by establishing vegetative cover, by surfacing with suitable materials, and/or by installing needed structures.

PURPOSE

- Reduce soil erosion
- Improve water quantity and quality
- Improve air quality
- Improve aesthetics
- Improve livestock health

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to urban, agricultural, recreational, or other frequently and intensively used areas requiring treatment to address one or more resource concerns.

CRITERIA

General Criteria Applicable to All Purposes

All planned work shall comply with federal, state, and local laws and regulations.

Take measures to limit the generation of particulate matter.

Incorporate user safety into the design of the heavy use area protection.

Design Load. Base design load(s) on the type and frequency of traffic, (vehicular, animal, or human) anticipated on the heavy use area. The minimum design load for areas that support vehicular traffic will be a wheel load of 4000 pounds.

Foundation. Evaluate all site foundations for soil moisture, permeability, textures, and bearing strength in combination with the design load and anticipated frequency of use.

Provide a base course of gravel, crushed stone, other suitable material and/or geotextile on all sites with a need for increased load bearing strength, drainage, separation of material, and soil reinforcement. Refer to Natural Resources Conservation Service (NRCS), National Engineering Handbook Series (NEHS), Parts 642 and 643 (formerly NEH, Section 20), Design Note 24, Guide for Use of Geotextiles and AASHTO M-288 (latest edition) provide guidance in quality specification and geotextile selection.

Provide an impervious barrier on sites with a porous foundation (high permeability rate), where there is a need to protect ground water from contamination.

Foundation preparation shall consist of removal and disposal at designated areas of soil and other material that are not adequate to support the design loads.

Surface treatment. Select a surface treatment that is stable and appropriate to the purpose of the heavy use area. Surface treatments must meet the following requirements according to the material used:

Concrete. Design the thickness and compressive strength of concrete according to the expected loading and use. For installations where it is necessary to limit the permeability of the concrete, refer to NRCS Conservation Practice Standard, Waste Storage Facility (313) and ACI 360R-06, Design of Slabs-on-Ground, for design criteria for slabs on grade.

Bituminous Concrete Pavement. Design the thickness of the pavement course, aggregate size and type, the type of proportioning of bituminous concrete materials, and the mixing and placing of

these materials in accordance with The Alabama Department of Transportation (ALDOT) criteria for the expected loading.

In lieu of a site specific design, for areas that will be subject to light use, pave with a minimum of 4 inches of compacted bituminous concrete over a subgrade of at least 4 inches of well compacted gravel. Use bituminous concrete mixtures commonly used for road paving in the area. Compact the surface with a heavy steel wheel roller until the bituminous concrete is thoroughly compacted and roller marks are eliminated.

Other Cementious Materials. Soil cement, roller compacted concrete, and coal combustion by-products (flue gas desulfurization sludge and fly ash) may be used as surface material if designed and installed to withstand the anticipated loads and surface abrasion.

Aggregate. Design fine or coarse aggregate surfaces at least 4-inches thick. If the surface will be compacted, choose a well graded aggregate.

Sprays and Artificial Mulches. When utilizing sprays of asphalt, oil, plastic, manufactured mulches, and similar materials, follow the manufacturer's recommendations for design requirements.

Other. Provide a minimum 4-inch thickness for surfacing materials such as limestone screenings, cinders, tanbark, bark mulch, brick chips, shredded rubber and/or sawdust.

Structures. Design any structures associated with the heavy use area including roofs, according to appropriate NRCS standards. Where NRCS standards do not exist, design structures according to the requirements of the particular construction material and accepted engineering practice. Base environmental design loads for buildings associated with heavy use areas on criteria in ASCE 7 – Minimum Design Loads for Buildings and Other Structures: ASCE/SEI 7-05.

Drainage and erosion control. Make provision for surface and subsurface drainage, as needed, and for disposal of runoff without causing erosion or water quality impairment. Make provision to exclude unpolluted run-on water from the treatment area. Shape all treatment areas to prevent ponding of water. The finished surface of the treated area at its outside edge shall be the same elevation as the adjacent soil surface.

Vegetative Measures. Lime, fertilize, prepare soil, seed, mulch, sod, and conduct vegetation management according to the planned use and appropriate conservation practice standard in the technical guide. In areas where traffic can be managed to maintain vegetative cover, grass species which are wear resistant and have fast recovery from wear may be used. Common bermudagrass, hybrid bermudagrass, bahiagrass, and tall fescue are species that may be used. Selection will be based on specific site and soil conditions. Vegetative cover will be established and managed according to the AL NRCS conservation practice standard, Code 342, Critical Area Planting. If vegetation is not appropriate, use other measures to accomplish the intended purpose.

Additional Criteria for Areas Utilized by Livestock

Use Alabama NRCS conservation practice standards: Critical Area Planting - Code 342; Fence - Code 382; Prescribed Grazing - Code 528A; Filter Strip - Code 393; Code 614 Watering Facility, or Access Control - Code 472, as companion practices, when needed, to meet the intended purpose of the heavy use area protection.

Make provisions to collect, store, utilize, and/or treat manure accumulations and contaminated runoff in accordance with other NRCS conservation practice standards. Porous heavy use protection for outdoor animal confinement locations will be underlain with good clay material to minimize drainage to groundwater. Surface runoff from these locations will be stored and/or treated.

Treatment area. Select a site having a ground slope of 4 percent or less in order to minimize cut and fill areas. Extend the treated area a minimum of 10 feet. (6 feet. for small ruminants that are managed separately from larger animals) outside the limits of facilities such as portable hay rings, watering facilities, feeding troughs, mineral boxes, and other facilities where livestock concentrations cause resource concerns. If concrete is used for treatment area, provide contraction joints at least every 10 ft. . Ensure finished surfaces are nearly level with positive drainage away from the center of the treatment area. Grade slopes around treatment area as appropriate to minimize ponding of water.

For walkways the minimum treatment width is 8 feet. (cattle only). A width of 15 feet is generally used for cattle/vehicles type walkways. Fence all walkways.

Provide treatment areas for stream crossings and watering ramps with a minimum bottom width of 10 feet. and a maximum bottom width of 20 feet. "Cattle only" stream crossings may be as narrow as

6 feet. Make provisions to minimize livestock standing or wading in the stream or pond. Slope ramps at 5 to 1 or flatter toward the water source with side slopes of 2.5 to 1 or flatter. Extend protection for watering ramps into the pond or stream to protect the pond or stream bottom. Where stream channels or pond bottoms are composed of stable coarse rocky material or solid bedrock, the requirement to extend the treatment area into the channel may be waived.

Stream Crossings. Locate crossings where the streambed is stable. Avoid stream crossings in wetland areas. Place crossings perpendicular to the direction of stream flow. Construct stream crossings with a toe trench constructed on the upstream and downstream edges. Install stream crossings in accordance with AL conservation practice standard, Code 578 - Stream Crossing.

Watering Ramps. Ramps may only be located in streams or in ponds to serve as a water source when no other practical source of livestock water is available or can be reasonably developed. Ramps are especially not preferred in streams and used only as a last-alternative watering source. Do not extend ramps more than 5 feet into the stream or to the center of the stream, whichever is less.

Install ramps in streams perpendicular to the direction of the stream flow and in areas where the streambed is stable. Avoid wetlands. Provide watering ramps located in streams with a toe trench constructed on the upstream and downstream edges of the ramp.

Extend ramps installed in farm ponds far enough into the pond to insure access to water during drought conditions.

Install ramp areas diversions or shape so as to prevent surface water from entering the ramp.

Fencing. Install fencing as necessary to control all animal traffic. Permanently fence stream crossings and watering ramps to prevent livestock access to the stream or pond except at the access ramps. Build fencing in accordance with AL conservation practice standard, Code 382 - Fence. Alternative fencing procedures, which provide permanent and positive control, may be approved on a case-by-case basis.

Geotextile. Install a non-woven needle-punched geotextile fabric under all aggregate treatment areas. Turn the outer edge upward and extend edges to the surface. Geotextile is not required if the foundation is on rock. The minimum requirements for geotextile fabric are as follows:

REQUIREMENTS FOR NON-WOVEN GEOTEXTILE

Property	Test Method	Minimum
Tensile Strength	Grab Test ASTM D 4632	120 lb.
Puncture Test	ASTM D 4833	60 lb.

Place geotextile fabric in the toe trenches of stream crossings and watering ramps. In the upstream toe of stream crossings and watering ramps in streams, the fabric will be backlapped over its own trench. Use a minimum 12-inch overlap at all joints.

Surface treatment. Use a maximum stone size of 2 in. for material surface treatment in areas such as watering facilities, hay rings, walkways, paddocks, and loafing areas.

Smooth uniformly and compact all material. Acceptable materials include ALDOT crushed stone sizes 5, 56, 57, 6, 67, 68, and 610, and Types A or B crushed aggregate base, and other similar products approved by an engineer. Gradation requirements are shown in Table 1. Minimum depth of material is 6 in., uncompacted. Materials that will not result in a smooth walking surface for livestock will be placed 5-inch thick uncompacted with a 1 inch topping for finer grained material.

Materials for treatment of stream crossings and watering ramps shall consist of one or more of the following:

1. Rock riprap
2. Graded stone
3. Crusher run stone

Base selection of rock riprap material for stream crossings on stream velocities and soil conditions at the site according to the AL NRCS conservation practice standard, Code 578 - Stream Crossing. Determine thickness of the material in accordance with the design. Extend surface material the full length and width of the treatment area. Smooth all surfaces uniformly and compact.

Place all finished material surfaces in the stream channel, at the same grade as the natural streambed above and below the site.

Additional Criteria for Areas Utilized for Recreation

Ensure the treated area is conducive to the overall recreation area and aesthetically blends with the general landscape and surroundings.

Evaluate plants, landscaping timbers, traffic control measures, wooden walkways, etc., for effectiveness, aesthetics, and accessibility as covered by the Americans with Disabilities Act.

CONSIDERATIONS

When stabilizing heavily used areas consider adjoining land uses and the proximity to residences, utilities, cultural resource areas, wetlands or other environmentally sensitive areas, and areas of special scenic value.

If vegetation will be part of the stabilization technique, consider the durability of the vegetation. Choose plant species that can withstand the expected use. Additional techniques such as geogrids, other reinforcing techniques or planned periods of rest and recovery may need to be employed to ensure that vegetative stabilization will succeed.
Heavy use area protection effects on the water budget, especially on volumes and rates of runoff, infiltration, and transpiration due to the installation of less pervious surfaces should be considered in the selection of surfacing materials.

The transport of sediments, nutrients, bacteria, organic matter from animal manures, oils, and chemicals associated with vehicular traffic, and soluble and sediment-attached substances carried by runoff should be considered in selection of companion conservation practices.

Consider using additional air quality AL NRCS conservation practices such as Windbreak/Shelterbelt Establishment - Code 380, or Herbaceous Wind Barriers - Code 603 to impede transport of particulate matter between the source (i.e., heavy use area) and nearby sensitive areas.

If the purpose of the heavy use area protection is improvement of water quality, (re)locate the heavy use area as far away from the waterbody or watercourse as possible. Work in and/or near streams discharges, wetlands, or waterbodies may require a permit from the United States Army Corps of Engineers, state water quality (permitting) authority, or local authority.

The size of the heavy use areas utilized by livestock is dependent on the landowner's operation including type and number of animal, confinement periods, and/or the intended use. The size of treatment areas can range from 30 square feet per animal in partial-confinement to 400 square feet per animal in total confinement to 4000 or more square feet for animal exercise areas. Heavy use protection areas should be kept as small as practicable.

When surface treatment such as bark mulch, wood-fiber, or other non-durable materials are used for short-term livestock containment areas, consideration should be given to vegetation of the affected area with a cover crop.

For areas with aggregate surfaces that will be frequently scraped, give consideration to the use of concrete or cementious materials to lessen the recurring cost of aggregate replacement. Four-inch thickness of concrete may be used around watering facilities for agricultural applications. If concrete is used, it should have a roughened surface.

To minimize differential settlement at concrete contraction joints, consider the use of a tooled or formed keyway joint.

Consider the safety of both animal and human users by avoiding slippery surfaces, sharp corners or surfaces and structures that might entrap users. Avoid the use of sharp aggregates that might injure livestock hooves.

Consider changing how livestock are managed to reduce the size of the heavy use area resulting in less expense, less maintenance and a more efficient operation.

Byproducts from coal fired power plants such as fly ash and sludge from scrubbers can vary significantly. Therefore, their toxicity and cementation characteristics should be known to ensure they are compatible with the intended use.

PLANS AND SPECIFICATIONS

Plans and specifications for heavy use area protection shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. Include in the plans and specifications construction plans, drawings, job sheets, or other similar documents. Specify in these documents the requirements for installing the practice, including the kind, amount, and quality of materials to be used.

OPERATION AND MAINTENANCE

Prepare an Operation and Maintenance (O&M) plan for and review with the landowner or operator. The plan shall specify that the treated areas and associated practices are inspected annually and after significant storm events to identify repair and maintenance needs.

Detail the O&M plan for the level of repairs needed to maintain the effectiveness and useful life of the practice.

For livestock operations, the O&M plan for heavy use areas may be included as a part of the overall waste management plan. Periodic removal and management of manure accumulations will be addressed in the O&M plan.

Implement conservation practices that limit particulate matter emission into long-term maintenance plans.

REFERENCES

Alabama NRCS Conservation Practice Standards:
Critical Area Planting - Code 342
Fence - Code 382
Stream Crossing - Code 578

National Handbook of Conservation Practice Standards:
Windbreak/Shelterbelt Establishment - Code 380
Herbaceous Wind Barriers - Code 603

National Engineering Handbook Series, Part 642 and 643.

USDA-Natural Resources Conservation Service. 1991. Guide for the Use of Geotextiles, Design Note Number 24. Washington, DC.

Watering Systems for Grazing Livestock: Great Lakes Basin Grazing Network and Michigan State University Extension.

Table 1. COARSE AGGREGATE (CRUSHED STONE) GRADATIONS

Aggregate	Percent Passing by Weight (mass), each Laboratory Sieve										
	2 in.	1.5 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	#4	#8	#16	#50	#200
5		100	90-100	20-55	0-10	0-5					
56		100	90-100	40-85	10-40	0-15	0-5				
57		100	95-100		25-60		0-10	0-5			
6			100	90-100	20-55	0-15	0-5				
67			100	90-100		20-55	0-10	0-5			
68			100	90-100		30-65	5-25	0-10	0-5		
610			100	90-100		25-60		7-30		0-15	
Type "A" Crushed Aggregate Base			100	86-100			26-55	15-41		3-18	5-15
Type "B" Crushed Aggregate Base	100	90-100	75-98		55-80		40-70	28-54	19-42	9-32	7-18